



The tectonometamorphic evolution of the Apuseni Mountains (Romania): Geodynamic constraints for the evolution of the Alps-Carpathians-Dinaride system of orogens

Martin Reiser (1), Ralf Schuster (2), and Bernhard Fügenschuh (1)

(1) Innsbruck, Institut of Geology, Innsbruck, Austria (martin.reiser@uibk.ac.at), (2) Geological Survey of Austria, Vienna, Austria

New structural, thermobarometric and geochronological data allow integrating kinematics, timing and intensity of tectonic phases into a geodynamic model of the Apuseni Mountain, which provides new constraints for the evolution of the Alps-Carpathians-Dinaride system of orogens. Strong differences in terms of deformation directions between Early and Late Cretaceous events provide new constraints on the regional geodynamic evolution during the Cretaceous.

Geochronological and structural data evidence a Late Jurassic emplacement of the South Apuseni Ophiolites on top of the Biharia Nappe System (Dacia Mega-Unit), situated in an external position at the European margin. Following the emplacement of the ophiolites, three compressive deformation phases affected the Apuseni Mountains during Alpine orogeny: a) NE-directed in-sequence nappe stacking and regional metamorphic overprinting under amphibolite-facies conditions during the Early Cretaceous (“Austrian Phase”), b) NW-directed thrusting and folding, associated with greenschist-facies overprinting, during the early Late Cretaceous (“Turonian Phase”) and c) E-W internal folding together with brittle thrusting during the latest Cretaceous (“Laramian Phase”). Major tectonic unroofing and exhumation at the transition from Early to Late Cretaceous times is documented through new Sm-Nd Grt, Ar-Ar Ms and Rb-Sr Bt ages from the study area and resulted in a complex thermal structure with strong lateral and vertical thermal gradients.

Nappe stacking and medium-grade metamorphic overprinting during the Early Cretaceous exhibits striking parallels between the evolution of the Tisza-Dacia Mega-Units and the Austroalpine Nappes (ALCAPA Mega-Unit) and evidences a close connection. However, Late Cretaceous tectonic events in the study area exhibit strong similarities with the Dinarides. Thus, the Apuseni Mountains represent the “missing link” between the Early Cretaceous Meliata subduction (associated with obduction of ophiolites) and the Neotethys subduction during Late Cretaceous times.